ADAPTIVE SIGNAL PROCESSING (CT502)
DA-IICT, Winter Semester 2019-2020

**Instructor:** Dr. Rajib Lochan Das

**Course Credits (L-T-P-C):** 3-0-2-4

**Prerequisites:** Digital Signal Processing

**Objective:** This course aims to discuss algorithms to process the signals in an adaptive manner where it is assumed that the underline system/channel may vary over time. Its application areas include sonar, radar, biomedical and communication signal processing. This course will discuss all the classical adaptive algorithms like LMS, NLMS, RLS etc. The emphasis is on finding theoretical analyses of the adaptive algorithms and also on the recently proposed algorithms.

**Contents:**

1. Introduction to Adaptive Filters: Brief discussion on digital filters, An overview of adaptive filters, Applications of adaptive filters.
2. Stochastic Processes: Introduction to random variables, discrete time stochastic process, Correlation matrix, Auto regressive process, Power spectral density and power spectrum estimation
6. Other LMS-Based Adaptive Filters: Normalized LMS (NLMS) algorithm, Affine projection algorithm (APA), Set-membership affine projection algorithm.
**Outcomes:**

By the end of this course, the student should be able to do the followings:
1. To implement adaptive filters for various applications like echo cancellation and systems or channels identification.
2. To analyze and implement Wiener filters, LMS, NLMS, APA, PNLMS, ZA-NLMS, ZA-PNLMS, RLS, Kalman Filters and Bussgang equalizers.

**Evaluation Policy:**

1st In-semester Exam: 20%
2nd In-semester Exam: 20%
Final Exam: 30%
Lab: 20%
Project: 10%

**References:**